

CLAIMS: add A2 -

CANCEL CLAIMS 1-55

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1. [A semiconductor processor for processing wafers or other semiconductor articles, comprising:

an enclosure for providing a substantially enclosed work space;

an interface port in said enclosure through which wafers are moved relative to said work space;

a docking station which is controllable to open and close the interface port, said docking station having features for receiving a wafer container in position for moving wafers between the wafer container and work space;

a plurality of processing stations; said processing stations having access openings which open to the work space to allow installation and removal of wafers relative to said processing stations;

a conveyor for conveying wafers to and from said plurality of processing stations.]

2. [A semiconductor processor according to claim 1 and further comprising a docking station relay for moving wafers between said docking station and said work space.]

3. [A semiconductor processor according to claim 2 wherein said docking station relay is pivotable.]

002250 4. [A semiconductor processor according to claim 2 wherein said
docking station loader is pivotable about a horizontal axis.]

CANCELLED 5. [A semiconductor processor according to claim 1 wherein said
docking station forms an air lock when a wafer container is in an
engaged position therewith.]

002250 6. [A semiconductor processor according to claim 1 and further
comprising a wafer transfer for transferring wafers from a wafer carrier
to a wafer tray.]

CANCELLED 7. [A semiconductor processor according to claim 6 and further
comprising at least one wafer tray which holds wafers in exposed
positions for processing fluid access to the surfaces of the wafers.]

002250 8. [A semiconductor processor according to claim 6 wherein said
wafer transfer includes a first carriage which is movable.]

CANCELLED 9. [A semiconductor processor according to claim 6 wherein said
wafer transfer includes a first carriage which is movable; said first
carriage having a transfer opening through which a wafer tray is
elevated to remove wafers from the wafer carrier.]

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10. [A semiconductor processor according to claim 6 wherein said
wafer transfer includes a transfer elevator.]

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11. [A semiconductor processor according to claim 6 wherein said
wafer transfer includes:

a first carriage which is movable; said first carriage having a
transfer opening through which a wafer tray is elevated to remove
wafers from the wafer carrier;

a transfer elevator.]

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12. [A semiconductor processor according to claim 6 and further
comprising a loaded tray holding station for holding wafer trays which
are loaded with wafers.]

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13. [A semiconductor processor according to claim 6 and further
comprising a movable first carriage and a movable second carriage.]

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1 CANCELLED 14. [A semiconductor processor according to claim 6 and further
2 comprising:

3 a movable first carriage; said first carriage forming part of said
4 interface; said first carriage having a transfer opening through which a
5 wafer tray is elevated to remove wafers from the wafer carrier;

6 a movable second carriage; said second carriage having a loaded
7 tray holding station for holding wafer trays which are loaded with
8 wafers;

9 a transfer elevator for moving the wafer tray through the transfer
10 opening and wafer carrier to transfer wafers onto the wafer tray.]
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12 CANCELLED 15. [A semiconductor processor according to claim 6 and further
13 comprising:

14 a movable first carriage; said first carriage forming part of said
15 interface; said first carriage having a transfer opening through which a
16 wafer tray is elevated to remove wafers from the wafer carrier; said
17 first carriage further having an empty tray pass-through opening through
18 which an empty wafer tray is lowered by said elevator;

19 a movable second carriage; said second carriage having a loaded
20 tray holding station for holding wafer trays which are loaded with
21 wafers;

22 a transfer elevator for moving the wafer tray through the transfer
23 opening and wafer carrier to transfer wafers onto the wafer tray.]
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16. [A semiconductor processor according to claim 6 and further comprising:

a movable first carriage; said first carriage forming part of said interface;

a transfer opening through said first carriage and through which a wafer tray is elevated to remove wafers from the wafer carrier;

an empty tray pass-through opening in said first carriage through which an empty wafer tray is lowered by said elevator;

empty wafer tray storage for holding empty wafer trays;

a movable second carriage; said second carriage having a loaded tray holding station for holding wafer trays which are loaded with wafers;

a transfer elevator for moving the wafer tray through the transfer opening and wafer carrier to transfer wafers onto the wafer tray.]

17. [A semiconductor processor according to claim 6 and further comprising a transfer elevator having an enlarged elevator head and a relatively narrow elevator stem.]

18. [A semiconductor processor according to claim 1 wherein said conveyor includes a mechanical arm assembly with a hand portion that engages a wafer tray.]

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9. [A semiconductor processor according to claim 1 wherein said conveyor includes a mechanical arm assembly; said mechanical arm assembly having:

an upper arm portion;

a lower arm portion connected to the upper arm portion;

a hand portion connected to the lower arm portion, said hand portion serving to engage a wafer tray.]

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20. [A semiconductor processor according to claim 1 wherein said conveyor includes a conveyor tram carriage movably mounted upon the frame.]

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21. [A semiconductor processor according to claim 1 wherein said conveyor includes a mechanical arm assembly; said mechanical arm assembly having:

a conveyor tram carriage movably mounted upon the frame;

an upper arm portion mounted upon said conveyor tram carriage for pivotal motion at a shoulder pivot;

a lower arm portion connected to the upper arm portion for pivotal motion at an elbow pivot;

a hand portion connected to the lower arm portion for pivotal motion at a wrist pivot;

a wafer tray engagement tool connected to the hand portion.]

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1 CANCELLED 22. [A semiconductor processor according to claim 1 wherein said
2 plurality of processing stations includes at least one centrifugal
3 processing station.]
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5 CANCELLED 23. [A semiconductor processor according to claim 1 wherein said
6 plurality of processing stations includes at least one centrifugal
7 processing station having an access opening with a processing closure
8 mounted to controllably open and close the access opening.]
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10 CANCELLED 24. [A semiconductor processor according to claim 1 wherein said
11 plurality of processing stations includes at least one processing station
12 having an access opening with a processing closure mounted for
13 controlled upward and downward action; said processing closure serving
14 to controllably close and open the access opening.]
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16 CANCELLED 25. [A semiconductor processor according to claim 1 wherein said
17 plurality of processing stations includes at least one centrifugal
18 processing station having an access opening with a processing closure
19 mounted for controlled upward and downward action; said processing
20 closure serving to controllably close and open the access opening.]
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CANCELLED 26. [A wafer handling apparatus for moving wafers to or from
an enclosed wafer container, comprising:

an enclosure for providing a substantially enclosed work space;

an interface port in said enclosure through which wafers are
moved relative to said work space;

a docking station which is controllable to open and close the
interface port, said docking station having features for receiving said
wafer container in position for moving wafers between the wafer
container and work space;

a docking station relay for moving wafers between said docking
station and said work space.]

CANCELLED 27. [A semiconductor processor according to claim 26 wherein
said docking station relay is pivotable.]

CANCELLED 28. [A semiconductor processor according to claim 26 wherein
said docking station loader is pivotable about a horizontal axis.]

CANCELLED 29. [A semiconductor processor according to claim 26 wherein
said docking station forms an air lock when a wafer container is in an
engaged position therewith.]

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1 CANCELLED 30. [A semiconductor processor according to claim 26 and further
2 comprising at least one inventory for holding wafers in position for
3 movement by said docking station relay.]

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5 CANCELLED 31. [A semiconductor processor according to claim 26 and further
6 comprising a wafer transfer for transferring wafers from a wafer carrier
7 to a wafer tray.]

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9 CANCELLED 32. [A semiconductor processor according to claim 31 wherein
10 said wafer transfer includes a first carriage which is movable.]

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12 CANCELLED 33. [A semiconductor processor according to claim 31 wherein
13 said wafer transfer includes a first carriage which is movable; said first
14 carriage having a transfer opening through which a wafer tray is
15 elevated to remove wafers from the wafer carrier.]

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17 CANCELLED 34. [A semiconductor processor according to claim 31 wherein
18 said wafer transfer includes a transfer elevator.]

1 CANCELLED 35. [A semiconductor processor according to claim 31 wherein
2 said wafer transfer includes:

3 a first carriage which is movable; said first carriage having a
4 transfer opening through which a wafer tray is elevated to remove
5 wafers from the wafer carrier;

6 a transfer elevator.]

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8 CANCELLED 36. [A semiconductor processor according to claim 31 and further
9 comprising a loaded tray holding station for holding wafer trays which
10 are loaded with wafers.]

11
12 CANCELLED 37. [A semiconductor processor according to claim 31 and further
13 comprising a movable first carriage and a movable second carriage]

14
15 CANCELLED 38. [A semiconductor processor according to claim 31 and further
16 comprising:

17 a movable first carriage; said first carriage forming part of said
18 interface; said first carriage having a transfer opening through which a
19 wafer tray is elevated to remove wafers from the wafer carrier;

20 a movable second carriage; said second carriage having a loaded
21 tray holding station for holding wafer trays which are loaded with
22 wafers;

23 a transfer elevator for moving the wafer tray through the transfer
24 opening and wafer carrier to transfer wafers onto the wafer tray.]

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1 CANCELLED 39. [A semiconductor processor according to claim 31 and further
2 comprising:

3 a movable first carriage; said first carriage forming part of said
4 interface; said first carriage having a transfer opening through which a
5 wafer tray is elevated to remove wafers from the wafer carrier; said
6 first carriage further having an empty tray pass-through opening through
7 which an empty wafer tray is lowered by said elevator;

8 a movable second carriage; said second carriage having a loaded
9 tray holding station for holding wafer trays which are loaded with
10 wafers;

11 a transfer elevator for moving the wafer tray through the transfer
12 opening and wafer carrier to transfer wafers onto the wafer tray.]

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14 CANCELLED 40. [A wafer handling interface according to claim 26 wherein
15 said transfer elevator has an enlarged elevator head and a relatively
16 narrow elevator stem.]

CANCELLED 41.

[A method for processing wafers and similar semiconductor articles using an automated semiconductor processing system, comprising:
providing a substantially enclosed working space within a processing system enclosure forming a part of said semiconductor processing system;
engaging a sealed wafer container with a docking station forming a part of said semiconductor processing system;
opening the sealed wafer container, said opening occurring with the sealed wafer container in fluid communication with a contained area forming part of the wafer processing system;
opening an interface port forming a part of said docking station, through which wafers can be moved between the docking station and the enclosed work space;
moving wafers between the sealed wafer container and the enclosed work space;
relaying the wafers from the docking station to a transfer apparatus within the semiconductor processing system;
transferring wafers from a wafer carrier to a wafer tray suitable for subsequent processing;
processing wafers held upon a wafer tray through multiple processing stations.]

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1 42. [A method for processing wafers according to claim 41
2 wherein said transferring wafers includes:

3 positioning the wafer carrier containing the wafers;

4 extending the wafer tray through the wafer carrier;

5 shifting wafers from the wafer carrier onto the wafer tray.]

6
7 43. [A method for processing wafers according to claim 51
8 wherein said transferring wafers includes:

9 positioning the wafer carrier containing the wafers;

10 extending the wafer tray up through the wafer carrier;

11 lifting wafers from the wafer carrier onto the wafer tray.]


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13 CANCELLED 44. [A method for processing wafers according to claim 41 and
14 further comprising placing a loaded wafer tray at a loaded tray holding
15 station.]

16
17 CANCELLED 45. [A method for processing wafers according to claim 41 and
18 further comprising storing unloaded wafer trays within the enclosed work
19 space for use in said transferring wafers.]

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21 CANCELLED 46. [A method for processing wafers according to claim 41 and
22 further comprising moving a first carriage from a carrier load position
23 to a transfer position.]

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47. [A method for processing wafers according to claim 41 and
further comprising:
storing unloaded wafer trays upon a first carriage for use in said
transferring wafers;
moving the first carriage from a carrier load position to a tray
pick position;
elevating a stored unloaded wafer tray from the first carriage;
moving the first carriage from the tray pick position to a transfer
position wherein said first carriage is ready for said transferring.]

CANCELLED 48. [A method for processing wafers according to claim 41 and
further comprising:
storing unloaded wafer trays upon a first carriage for use in said
transferring wafers;
moving the first carriage from a carrier load position to a tray
pick position;
elevating a stored unloaded wafer tray from the first carriage onto
an elevator;
moving the first carriage from the tray pick position to a pass-
through position;
lowering a wafer tray on said elevator through a pass-through
opening in the first carriage;
moving the first carriage from the pass-through position to a
transfer position wherein said first carriage is ready for said transferring.]

CANCELLED 49.  A method for processing wafers according to claim 41 and

2 further comprising:

after said transferring wafers, moving a second carriage to an extended tray load position;

5 placing the loaded wafer tray at a loaded tray holding station
6 upon said second carriage.

100th 200th 300th 400th 500th 600th 700th 800th 900th 1000th
 1100th 1200th 1300th 1400th 1500th 1600th 1700th 1800th 1900th 2000th
 2100th 2200th 2300th 2400th 2500th 2600th 2700th 2800th 2900th 3000th
 3100th 3200th 3300th 3400th 3500th 3600th 3700th 3800th 3900th 4000th
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CANCELLED 50.

1 [A method for processing wafers according to claim 41 and
2 further comprising:

3 storing unloaded wafer trays upon a first carriage for use in said
4 transferring wafers;

5 moving the first carriage from a carrier load position to a tray
6 pick position;

7 elevating a stored unloaded wafer tray from the first carriage onto
8 an elevator;

9 moving the first carriage from the tray pick position to a pass-
10 through position;

11 lowering a wafer tray on said elevator through a pass-through
12 opening in the first carriage;

13 moving the first carriage from the pass-through position to a
14 transfer position wherein said first carriage is ready for said transferring;

15 after said transferring wafers, moving a second carriage to an
16 extended tray load position;

17 placing the loaded wafer tray at a loaded tray holding station
18 upon said second carriage.

51. [A method for processing wafers and similar semiconductor
articles using an automated semiconductor processing system, comprising:
providing a substantially enclosed working space within a
processing system enclosure forming a part of said semiconductor
processing system;
engaging a sealed wafer container with a docking station forming
a part of said semiconductor processing system;
opening the sealed wafer container; said opening occurring with
the sealed wafer container in fluid communication with a contained area
forming part of the wafer processing system;
opening an interface port forming a part of said docking station,
through which wafers can be moved between the docking station and
the enclosed work space;
moving wafers between the sealed wafer container and the
enclosed work space;
relaying the wafers from the docking station to another position
within the processing enclosure.]

52. [A method for processing wafers according to claim 51
wherein said relaying includes pivoting the wafers from the docking
station.]

1 53. [A method for processing wafers according to claim 51
2 wherein said relaying includes pivoting the wafers from the docking
3 station about a horizontal pivot axis.]

4
5 54. [A method for processing wafers according to claim 51
6 wherein said relaying includes pivoting the wafers from the docking
7 station and resting the wafers upon a movable carriage.]

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9 ~~CANCELLED~~ 55. [A method for processing wafers according to claim 51
10 wherein said relaying includes pivoting the wafers from the docking
11 station and resting the wafers upon a movable carriage in an orientation
12 displaced approximately 90°.]

13 ADD CLAIMS 56-63

14 Please add new claims 64-68

15 Please add new claims 69-73

16 Please add new claims 74-79.

17
18 Add B37

19
20 Add C37